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ABSTRACT

In Sweden, higher education in agriculture is provided exclusively by the Swedish University of Agricultural Sciences. The 130 students admitted to the Master of Science program in agriculture annually may choose to specialize in one of six specialty areas (plant science, animal science, food science, biotechnology, economics, and engineering), combine specialty areas, or pursue a curriculum with a distinct ecological profile. From the early 1960s until 1992, the master's program in agriculture took 5 years and included a preparatory year of practical farm work and agricultural theory. In autumn 1992, the program was changed to a 4.5-year program of course and thesis work. The new core curriculum includes an overview of agriculture, agricultural history, its ecological and global aspects, the history and theory of science and research, scientific methodology, instruction in study and research techniques. The revised program is designed to train students to handle present and future problems within agriculture and related areas. Sweden does not currently have a bachelor of science-level program in agriculture. Most courses in the curriculum are currently based on a mixture of traditional teaching and student-activating teaching methods. A shift toward problem-oriented teaching is likely, however. (MN)

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Developments in the Curriculum for the Swedish MSc Programme in Agriculture

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ABSTRACT

In Sweden higher education in agriculture is exclusively provided by the Swedish University of Agricultural Sciences. 130 students are admitted yearly to the MSc programme in Agriculture. Students choose one of the main specializations Plant Science, Animal Science, Food Science, Biotechnology, Economics or Engineering. Specializations can also be combined, or given a distinct ecological profile.

From the early 60's until 1992, the MSc programme in Agriculture comprised 5 years of study, starting with a preparatory year including both practical farm work and agricultural theory. As from the autumn term 1992, the MSc programme was changed to comprise 4.5 years of course and thesis work. Practice is no longer compulsory, but recommended. To provide the students with a comprehensive and scientific frame of reference, half of the first study year is spent on a Core Curriculum course. This course includes an overview of agriculture (from production to consumption), agricultural history, its ecological and global aspects, the history and theory of science and research, scientific methodology, study techniques, how to write scientific reports, give oral presentations and make literature searches, etc. The teaching in the Core Curriculum course is to a large extent based on the problem based learning method.

Individual courses in the study programme are, as before, given as block courses, but have been enlarged, mainly by integration of courses or subjects. More emphasis is given to basic subjects as well as basic parts of applied subjects, and the MSc thesis work has been extended. Students are recommended to do some part of their study programme abroad. A pedagogical policy has been agreed upon, in order to provide students with a better ability to meet future problems and challenges.

INTRODUCTION

In Sweden higher education in agriculture is exclusively provided by the Swedish University of Agricultural Sciences. This means that the university has a responsibility for educating students not only for truly academic/scientific tasks, but also for more professional assignments, e.g. as teachers and advisers. 130 students are admitted yearly to the MSc programme in Agriculture.

Like in many other countries, the number of applicants to MSc studies in Agriculture has decreased during the last ten years. This has occurred in spite of increased activities on information to pupils in upper secondary schools. The decrease of applicants most likely reflects

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the trends in Swedish agriculture, which today stands for approximately 1% of GNP, with only 30 000 farmers fully occupied on their enterprises. The challenge for higher education in agriculture will therefore be to broaden the activities and educate students with ability to solve problems within parts of the whole agro-food/environment/natural resources sector. This includes conventional agriculture in industrialized and developing countries, but also e.g. the food sector, food safety, alternative farming methods, as well as environmental quality and non-farming uses of biological rural resources.

EVALUATION OF THE FORMER MSc PROGRAMME IN AGRICULTURE

From the early 60's until 1992, the Swedish MSc programme in Agriculture included 5 years of study, or in total 200 study points (40 p/year). The first study year - the so called preparatory year -included 6 months of theoretical studies in traditional agricultural subjects, plus 7 months of farm practice. The subsequent four years were spent on university courses (min 140 p) in basic and applied subjects, mainly within the area of specialization chosen by the student. The four years at university also included MSc thesis work (10 p) and 3 months vocational practice.

The Swedish University of Agricultural Sciences, including the Swedish MSc programme in Agriculture described above, was evaluated in 1990/91. The evaluation, which was requested by the Swedish government, included an international survey by a team from the Netherlands.

In the evaluation, the former Swedish MSc programme in Agriculture was given credits for educating good professionals, e.g. teachers and advisers, and that relations between university teachers and students were very good. On the other hand the MSc programme was criticized for not being truly scientific/academic and that basic sciences as well as basic parts of applied subjects had been given too little emphasis. Another point for criticism was the fairly large number of relatively small courses, often resulting in overlapping and too little integration between subjects. An approach towards more of teacher-supervised self studies, seminars, project work and problem based learning was recommended.

As a consequence of the trends in agriculture and society, the evaluation of the study programme - and also increased interest in new pedagogical methods - a revision of the Swedish MSc programme in Agriculture was started in the autumn 1991.

THE NEW SWEDISH MSc PROGRAMME IN AGRICULTURE

As from the autumn term 1992 the Swedish MSc programme in Agriculture has been changed. The objective of the new MSc programme is formulated as follows:

The education within the MSc programme in Agriculture shall give competence to scientifically deal with questions related to land use, plants, animals and microorganisms, as well as the relationship to production, processing, natural resources, environment and society.

Persons with a MSc in Agriculture shall on scientific, technological and social/economic grounds be able to identify, formulate and solve complex problems, and also critically evaluate suggested solutions. They shall further be able to transmit knowledge and in their professional role consider human, ethical and international aspects.

The education shall develop personality, give ability to independently develop professional skills and also constitute a basis for PhD training.

Disposition of the MSc programme in Agriculture

The new Swedish MSc programme in Agriculture includes in total 180 study points, which means 4.5 years of study. The programme comprises the following elements:

* A Core Curriculum course, 20 points
* Other courses, in total minimum 140 points
* MSc thesis 20 points.

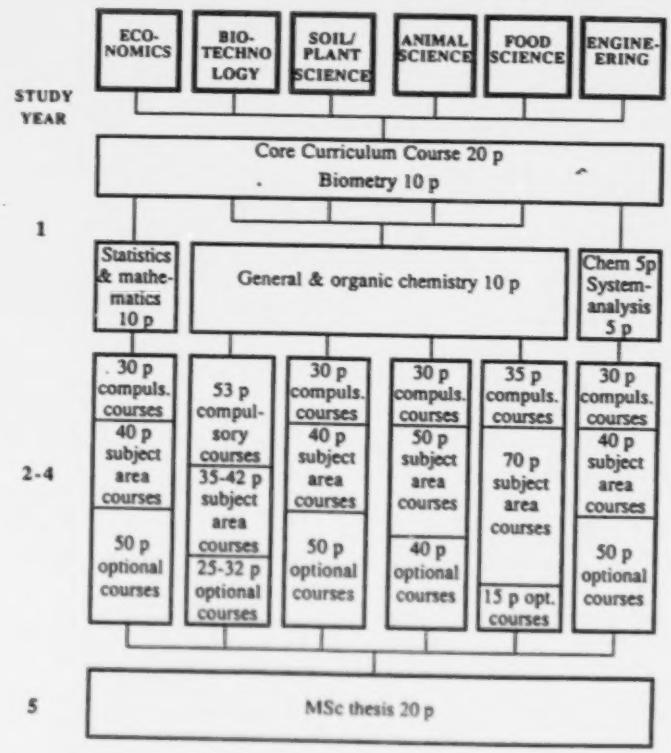
During the first study year of the MSc programme students choose their main subject area for specialization. At present students can choose among the following main subject areas:

- Soil/Plant Science
- Animal Science
- Food Science
- Biotechnology
- Economics
- Engineering

Subject areas can also be combined, or given a distinct **ecological profile**. Within each specialization students must take compulsory courses in basic sciences, and in addition a number of points from basic and applied courses related to the area of specialization. Every curriculum also contains an optional part.

An overview of the MSc study programme in Agriculture is given in the adjacent figure. One study year consists of 40 points.

MAIN SUBJECT AREAS / SPECIALIZATIONS WITHIN THE MSc PROGRAMME IN AGRICULTURE



Course organization and content, pedagogic policies and internationalization

The study year at The Swedish University of Agricultural Sciences consists of two terms, with 20 study points per term. Individual courses in the MSc programme in Agriculture are now, as before, given as block courses. This means that students take one, or maximum two courses at a time. In the new study programme the number of courses has been reduced, mainly by unification and integration of courses within and between subjects. The purpose has been to improve co-ordination and the comprehensive view. The majority of courses comprise 10 points full time teaching, but also 5 (half-time), 15 and 20 point courses do occur. Examination is performed within each course. An important change is that basic sciences and basic parts of applied sciences have been given more emphasis. A shifting towards a more academic - less professional education has taken place.

At the same time as the content of the study programme was revised, a **pedagogical policy** has also been agreed upon and stated in a policy document. The main intention is to make teachers and students aware of the learning process, and what is needed to educate students for ability to meet with future problems and challenges. Independent work, problem based learning, scientific approaches and communication skills are some important components of the MSc programme in Agriculture.

Internationalization is another important feature of the MSc programme, and students are highly recommended to take parts of their study programme abroad. Student exchange occurs within ERASMUS, COMETT and NORDPLUS. In addition there is some bilateral exchange with the United States, Russia, and Estonia, as well as possibilities to do the MSc thesis work abroad. Language courses can be included in the study programme.

The Core Curriculum course

In order to facilitate the transition from upper secondary school to university studies, as well as generally broadening the student's perspective, a Core Curriculum course has been introduced as an introductory part of the new Swedish MSc programme in Agriculture. The main objectives for this Core Curriculum course are as follows:

* to give the students common frames of knowledge and reference
* to introduce the students to a scientific approach
* to make the students aware of the role of universities in society
* to give the students knowledge of circumstances specific for biological production and rural areas
* to introduce the students to the social environment and planning situation typical for a farm enterprise and make them develop their ability to identify problems relevant for the sector, and
* to give the students an identity, characterized by social kinship, security and study motivation.

The Core Curriculum course comprises one term of full time studies, although it is subdivided in two parts, with the first ten points given the first period of the autumn term, and the remaining 10 points given in the last period of the spring term. The Core Curriculum course starts with an introduction week and thereafter consists of five themes, given in the order listed below.

Theme 1. The food system.

This topic constitutes the major part of the first half of the course and covers the Swedish food system from farm production to processing, retailing, consumption and recycling. The perspectives will be biological, technical, economical, ethical and environmental.

An objective of this theme is to describe a farm enterprise in terms of planning, realization controlling its economical and biological resources, and also to understand the farmers social situation, entrepreneurship and role in the food system. The students get an insight in various forms of Swedish plant and animal production, as well as the processing and marketing of the products.

Theme 2: Science and knowledge

This theme has its focus on the individual student and how we look upon knowledge from different points of view. The learning process, study techniques, scientific approaches and methodology, scientific writing and oral presentations are all vital subjects.

Theme 3. Agricultural history.

One main task with this topic is to find out how agriculture approx. 6000 years ago started to move from the Middle East to Western Europe and finally over to the Scandinavian countries. The connection between land use, population growth and technical development will also be studied. The distinction between natural- and cultural-landscape and how human activities through several thousand years have influenced this process are other important subjects.

Theme 4. Rural and urban areas.

The flows of resources from and to urban areas can be described in scientific terms and is one of many aspects of this topic. Also historical, humanistic and economical aspects in connection with different confrontations between rural and urban areas will be penetrated.

Theme 5. The global food situation.

The two concepts of development and food production are essential to this topic. One way to grasp such wide items is to pick out a group of countries with specific characteristics. This year Argentina, Bangladesh, Kenya, Japan, the Netherlands and Poland have been chosen. These countries represent many different situations in terms of natural resources, economic activity, exports/imports of food, population growth etc.

During the course students have opportunity to make two study tours and each group of students is also continuously in contact with a farm in the neighborhood of the university. This gives the student possibility to follow what is happening on a farm over the year and an understanding of the farmers' social and professional situation.

In the Core Curriculum course a **problem based learning** system is practised to a high extent. This means that students are faced with situations/problems of relevance to the theme studied, and thereafter have to get the knowledge needed in different ways. The learning process is thus self-directed. The work is mainly performed in groups of 6-7 students, with one tutor for each group. Approximately 10 lectures per week are given as overviews.

MSc thesis

Towards the end of the studies students must perform their MSc thesis work. In the new Swedish MSc programme in Agriculture the thesis part has been extended from 10 to 20 study points. The purpose of the degree project is that the student should exhibit the capability to apply the knowledge acquired during the study period and to deal independently with a problem area.

DISCUSSION

In the new Swedish MSc programme in Agriculture the field of activity has been broadened, the scientific approach is more pronounced and pedagogics of teaching and learning given more emphasis. The main objective is to train students for ability to handle present and future problems within agriculture and related areas. In many countries the study programme for university studies is divided in two levels - BSc and MSc. The introduction of a BSc level in the Swedish higher education in Agriculture is being discussed, but has not yet been decided.

In comparison with the former study programme in Agriculture, practical experience is now given much less importance. In the former programme, 7 months of farm practice, plus 3 months of vocational practice were compulsory. Half of this practice was done in summertime. In the new study programme, no compulsory practice is included at all. Opinions were divided whether this was a wise decision or not. Many people pleaded for 3-5 months of farm- and/or vocational summer practice to be compulsory in the study programme. Students are, however, highly recommended to do some optional practice of relevance for their field of study.

The introduction of a Core Curriculum course the first year of studies seems beneficial in order to give students a scientific and comprehensive frame of reference to the whole agro-food/environment/natural resources sector. This must also be useful for the rest of their studies, and might therefore improve the educational process as a whole.

The first Core Curriculum course has recently been completed. A majority of the students have expressed a positive impression of the course, both with regard to the content and to the problem based learning method used. Although some students coming directly from secondary upper school found it a bit difficult in the beginning to adapt to this type of studies, all students experienced that the problem based learning method contributed in developing their skills and critical thinking, thus preparing them to better handle new situations. Students also pointed out that the continuous contact with a farm during the whole course positively influenced the understanding of the agro-food sector.

A feature that is rather unique for Swedish universities is the block system, where students concentrate on one, or maximum two courses at a time, including examination. In many other countries students take approximately 4-6 parallel courses, that go on simultaneously over the whole term. The exam period is then mostly concentrated to the end of the term. The choice of system probably depends on tradition. It might be interesting to discuss if any of the two systems has an advantage in fulfilling the objectives of higher education, both from a scientific and a pedagogic perspective.

Pedagogical aspects of Swedish university teaching have been given much attention the last years. More emphasis is put on pedagogic training and teaching skills of university teachers. The Council for the Renewal of Undergraduate Education has been founded, distributing grants to pedagogic experiments in university teaching. Also at the Swedish University of Agricultural Sciences the pedagogical aspects are given prominence. Within the MSc programme in Agriculture a variety of teaching methods is used. The problem based learning approach in the Core Curriculum course is just one example. At present, most other courses in the programme are based on a mixture of traditional teaching and more student activating teaching methods. In the future a further shifting towards problem oriented teaching can be expected.